

## Approach Monitors Aircraft Emergencies

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Flight data recorders (FDRs), the dreaded “black box” of aircraft electronic systems, are usually consulted when it is too late to avert an in-air disaster. But a solution created by [AeroMechanical Services \(AMS\) Ltd.](#) and satellite network specialist [Iridium](#) can continuously stream in-flight position and performance information from an aircraft’s FDR anytime during a flight or at the first sign of trouble, to hopefully avert potential airline disasters due to systems problems.

The solution uses AMS’ Automated Flight Information Reporting System (afirs) and the Iridium satellite constellation to transfer the information from an aircraft in flight to a control station. It operates with an afirs mode known as FlyhtStream to provide Internet-based data delivery to end users. For any anomalous operational behavior that occurs during an aircraft’s flight, the system triggers an alert and begins streaming operating performance data via Iridium to designated recipients, including airline executives and ground support crews, aircraft and engine manufacturers, air-traffic controllers, and search-and-rescue personnel. The system has undergone successful in-flight trials over the Atlantic Ocean and other areas globally. The afirs service is being used by more than 30 passengerservice airlines and business aviation customers as an economical solution to monitor in-flight aircraft performance from anywhere in the world.

One of the classic airline disasters, of which little is yet known, was Air France Flight 447, enroute to Paris, France from Rio de Janeiro, Brazil. The aircraft went down in the Atlantic Ocean on June 1, 2009, with the crew and all 228 passengers perishing. Because of the water’s depths, the Airbus A330-200’s FDRs ([see figure](#)) were never located, and details were never available to reconstruct details of the accident. The communications from the aircraft prior to the accident were incomplete, leaving investigators with a mystery regarding the cause of the crash.

The afirs-over-Iridium solution is meant to prevent such a disaster, or to at least provide adequate warning to search-and-rescue and other personnel that such a disaster may be imminent. The system leverages the capabilities of the onboard FDRs to provide realtime situational awareness of in-flight operations and flight-path information. It provides additional information in the wake of an accident, should the FDRs be lost after a crash. AMS introduced its afirs product in 2004, under the brand name FLHYT. The firm’s afirs 220 programmable electronic device monitors, records, and processes data as well as real-time communications over the Iridium satellite network.

The FlyhtStream function can be programmed to automatically trigger an alert and start streaming data over Iridium based on a set of conditions that could be warning signs of an accident. These conditions could include loss of cabin pressure, rapid change in altitude, engine failure, and other key events. The data-streaming capability, including continuous transmission of an aircraft's GPS coordinates, can also be triggered remotely by a ground crew or by the pilot of an airplane experiencing an emergency situation. The afirs 220 integrates routine aircraft performance data, Global Positioning System (GPS) location information, and two-way voice and text-messaging communications between aircraft pilots and ground support crews or air traffic controllers during flights.

The afirs 220 is installed in an aircraft's avionics bay and is connected to aircraft sensors through data buses. The system includes a small cockpit indicator panel and several configurations of Iridium satellite telephones for use by aircraft pilots or cabin crews. A dual-element antenna is mounted on top of the aircraft's fuselage, to provide a connection to the Iridium satellite network and for reception of GPS time and position data. The afirs 220 monitors an aircraft's health through the sensor data, analyzing a preprogrammed set of data parameters, such as engine performance, vibration, and other system deviations that might signal a problem. Data deemed to be high priority is compressed and transmitted via Iridium's satellite network to users on the ground. Lower-priority data is saved to a data-storage card that can be downloaded as needed after an aircraft lands. The afirs 220 has been installed on more than 25 aircraft types and models, including Airbus A320 aircraft, Boeing 757s, and Boeing 767s.